DOCUMENT RESUME

ED 178 547 TM 007 825

AUTHOR Rupnow, Allan A.
TITLE A Sixteen Item Trait Anxiety Scale for Children and Children, Physiological Sweating, Teaching Approaches and Anxiety. Research Reports, Volume III, Issue IV.
INSTITUTION Iowa State Univ. of Science and Technology, Ames. Research Inst. for Studies in Education.
PUB DATE May 78
NOTE 30p.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Anxiety; Competition; Intermediate Grades; *Measurement Techniques; *Physical Activities; *Physical Education; Problem Solving; Psychomotor Skills; Sex Differences; Student Attitudes; Teaching Techniques; Test Validity
IDENTIFIERS *Palmar Sweat; *Physical Education Anxiety Scale for Children; Trait Anxiety

ABSTRACT

Two research reports are included in this document. The first is a study of children's anxiety. A sixteen-item trait anxiety scale was used on a population of students in grades 4 through 6. The first ten items measured anxiety about making mistakes in performing physical education activities, and the remaining six items measured general anxiety. Results indicated that girls showed more anxiety than boys and that there was a high correlation between unskilled, unfit, and unmotivated children and anxiety. The second report is concerned with the relationship of children's sweating and anxiety to competitive and problem solving teaching techniques in physical education classes. Students in grades 4 and 5 were administered the 20-item Physical Education Anxiety Scale for Children (PEASC) to determine their anxiety levels about motor performance. A sweat bottle measure was used to determine the quantity of palm sweating. It was concluded that children sweated more under competitive conditions than under the problem solving method. There were no significant results for analyses of PEASC scores. (MH)

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Research Institute for Studies in Education

College of Education, Iowa State University
Ames, Iowa 50011

TM007 825

A SIXTEEN ITEM TRAIT ANXIETY SCALE FOR CHILDREN
and
CHILDREN, PHYSIOLOGICAL SWEATING, TEACHING APPROACHES AND ANXIETY

By
Allan A. Rupnow

Volume III, Issue IV

Available from:
Research Institute for Studies in Education
College of Education
Iowa State University
Ames, Iowa 50011

May 1978

PREFACE

The Research Institute for Studies in Education encourages and assists College of Education faculty in research endeavors. By way of it's Released Time for Research Program, RISE and the department in the College provide faculty with time and some support to engage in research which is meaningful to the faculty member, the department, and the College generally. Very often this research is initiation for research on a wider and more comprehensive scale.

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Volume III of RISE Reports contains the faculty reports of research done with some RISE Released Time Support during 1977-78. Research reported during this period is presented in the following issues:

Issue I Media and Attitudes: A Bibliography of the Twenty Five Years of Audio Visual Communication Review by Michael Simonson, Pamela Thies, and Georgeann Burch (Department of Secondary Education)

Issue II A Survey of the Status of Education for Gifted Elementary Children in the State of Iowa by Joan Brieter (Department of Elementary Education)

Issue III Elementary School Children's Views of Occupational Roles by Ruth Scheresky (Department of Elementary Education)

Issue IV A Sixteen Item Trait Anxiety Scale for Children

and

Children, Psychological Sweating, Teaching Approaches and Anxiety by Allan A. Rupnow (Department of Physical Education

It is hoped that these presentations will be informing and of interest to all College of Education faculty. We especially hope this evidence of research will be inspiring to those who are initiating their first faculty research endeavor.

William A. Hunter, Director
Research Institute for Studies in Education

May 1978

TABLE OF CONTENTS

TOPIC	PAGE
PREFACE	i
Part I. A Sixteen Item Trait Anxiety Scale for Children	1
INTRODUCTION	1
METHOD	2
Subjects	2
INSTRUMENT	2
PROCEDURE	4
REFERENCES	10
Part II. Children, Physiological Sweating, Teaching Approaches and Anxiety	11
METHOD	12
Subjects	12
INSTRUMENT 1	12
INSTRUMENT 2	13
PROCEDURES	14
STATISTICAL ANALYSES	20
CONCLUSIONS	21
REFERENCES	23

LIST OF TABLES

Page

Part 1: A Sixteen Item Trait Anxiety Scale for Children

Table 1. Summary Table of ANOVA for Trait Anxiety . . . 6

Table 2. Means for Trait Anxiety 6

Table 3. Means for General Anxiety 7

Table 4. Summary Table of ANOVA for General Anxiety . . 7

Table 5. Correlation Coefficients for Anxiety from Teacher Ratings 8

Part II: Children, Physiological Sweating, Teaching Approaches and Anxiety

Table 1. Summary Table of ANOVA 21

A SIXTEEN ITEM TRAIT ANXIETY SCALE FOR CHILDREN

Allan A. Rupnow
Iowa State University

Introduction

In an initial investigation by Rupnow (1976), an attempt to develop an anxiety scale for children relevant to the physical education setting was made. In that study data were collected from 174 fourth, fifth, and sixth grade children. The instrument tested totaled twenty (20) items which were administered on a test-retest basis yielding correlations above .80. A factor analysis indicated that two distinct factors were evident in the instrument. Factor I, comprised of ten (10) items, was summarized in meaning as worry about making mistakes during performance (or trait anxiety) while involved in a physical education activity. Factor II, comprised of six (6) items, was interpretted as worry about the environment per se (or general anxiety).

The initial study of the instrument, which modeled Sarason's (1958) scale, dictated a revision of the 20-item scale. The purpose of this study was to complete development of an instrument that would reveal information concerning the concept of worry about making mistakes during performance (trait anxiety). A simple, easy-to-administer scale would provide the researcher interested in studying methodological environments in elementary physical education an instrument for collecting valuable data. The instrument could further be used by the practitioner to more fully understand the nature, personality and emotions of children in his charge.

Method

Subjects

All available fourth, fifth, and sixth grade boys and girls from two elementary schools in an Iowa community were selected as subjects for this study. Two other elementary schools existed in the same community but were eliminated for this study. One school was eliminated because it was involved in the initial phase of the instrument development, while the other school had participated in a pilot study related to a previous investigation.

One school (School A) provided data from 233 children, while the second school (School B) yielded data on 203 children for a total number of subjects involved in this study of 433. There were 238 male subjects and 195 female subjects. The socio-economic status of the subjects participating in the study was white, middle-class children in a midwestern United States community.

Instrument

The 16-item anxiety scale used for this study was comprised of 10 items identified from a previous study as "trait A" items and six items from a previous study identified as "general anxiety" items. The items were meshed together interspersing the six "general anxiety" items with the "trait A" items. The asterisked items are the general anxiety items in the P.E.A.S.C. shown below in Figure 1.

Figure 1. P.E.A.S.C. (Physical Education Anxiety Scale for Children)

* 1. Do you begin to worry when the teacher says that it's time to put away your things and get ready to go to the gym?

2. The physical eduation teacher has just said that he is going to call upon some boys and girls to show the rest of the class how a sport or stunt should be done. Do you hope he will call on you?

* 3. If you have dreams at night about school, would you dream that you could not do any of the physical education stunts or sports?

4. When you are playing a ball-type game, do you feel that other children in the class are better than you?

5. Do you feel you will make the mistake or last out that will make your team lose?

6. Do you worry about being weak, slow, and clumsy?

7. Do you worry about not being wanted on a team, or that you might be picked last if your class chooses up teams.

* 8. During the period before your P.E. class, do you worry about how well you will do in your physical education class?

9. You have been picked to get up in front of the class and show a sport or stunt to your class, are you afraid that you are going to make some bad mistakes?

* 10. When you are at home and you are thinking about your physical education class for the next day, do you worry that you will do poorly during that class?

11. When it is your turn to try to score in a team game, would you worry that your teammates or the other team players will make some wise remarks about you?

12. When it's your turn to test in physical education, do you get a funny feeling in your stomach, or do you feel your heart beating faster?

* 13. Do you sometimes dream at night that your classmates are angry at you you because you did not do well in your physical education class?

14. When you are playing in physical education, do you usually think you are doing poorly?

* 15. Do you wish that you would not have to worry so much about physical education class?

16. During the team games do you try to stay out of the way so you won't make a bad mistake?

Procedure

The instrument was administered by the investigator in the classroom during the first eight to ten minutes of a regularly scheduled physical education period. After a brief introduction, the children printed their name, grade and room number on an answer sheet. Instructions were given to choose only one of four available choices that best approximated ones feelings about sixteen questions that would be asked. The choices were: (1) never, (2) once in a while, (3) many times and (4) always, reading from right to left on the answer sheet. The subjects were assured that this was not a test with any right or wrong answers, and that no one except the investigator would see their answers.

All 16 items were recorded on the tape recorder. An appropriate introduction on the tape recorder was played to aid the child in becoming acquainted with the sound, voice, and speed of the recorder. An appropriate pause between questions to allow a brief segment of time to reflect on each question was programmed into the recorder.

Another facet of the instrument development was to gather information from a source close to the child--his physical education teacher. Schools A and B each had their own physical education instructor. The two physical educators used in the study were male, with approximately six to 10 years of teaching experience, and both had worked previously with the investigator in several capacities professionally. Both instructors were asked to rate each of the subjects under their charge. The Teacher's Rating Scale contained five factors with each factor measurable on a three-point scale. (See Figure 2)

Figure 2. Teacher's Rating Scale

Name _____

Grade/Room _____

From your observation or testing, this child is (check one):

1.	unskilled	somewhat skilled	skilled
2.	unfit	somewhat fit	fit
3.	indifferent	follower	leader
4.	nervous	somewhat nervous	relaxed
5.	unmotivated	somewhat motivated	motivated (enthusiastic)

Results

The data were run via a four-way ANOVA. The ten-trait anxiety item scores of each subject was summed. The results concerning the interaction of trait anxiety and sex indicated a significant difference

in which the female scored significantly higher in the trait items than the male. See Table 1. Significant differences were not found between grade and trait items. There were also no significant differences between the two schools and the trait items. For the interested reader, the means are reported in Table 2.

Table 1. Summary Table of ANOVA for Trait Anxiety

Source	df	SS	MS	F
Sex	1	496.22	496.22	30.08*
Grade	2	14.42	7.21	0.58
School	1	0.03	0.03	0.07
Sex/Grade	2	47.33	23.66	1.18
Sex/School	1	28.55	28.55	1.80
Grade/School	2	6.64	3.32	0.06
Sex/Grade/School	2	8.62	4.31	0.38

*Significant at .0001 level

Table 2. Means for Trait Anxiety

N	Sex	Grade	Mean
86	M	4	20.45
63	F	4	22.69
68	M	5	19.75
64	F	5	22.73
84	M	6	20.20
68	F	6	21.81

The six general anxiety item scores were also summed. General anxiety or worry about the physical education environment per se dropped

by grade with the female initially scoring at a significantly higher level than the male. The female remained higher but insignificantly different by grade six (6). See the means in Table 3. Note also in the Summary Table of Anova (Table 4) that no other significant differences occurred in any of the other interactions. However, the sex interaction cannot be accepted due to the fact that the intervals on the scale are believed to be unequal, and therefore, a "floor effect" is produced.

Table 3. Means for General Anxiety

N	Sex	Grade	Mean
86	M	4	11.25
63	F	4	13.09
68	M	5	9.96
64	F	5	10.98
84	M	6	9.58
68	F	6	9.60

Table 4. Summary Table of ANOVA for General Anxiety

Source	df	SS	MS	F
Sex	1	89.60	89.60	10.69*
Grade	2	463.66	231.83	27.64*
School	1	0.29	0.29	0.44
Sex/Grade	2	78.39	39.19	3.50
Sex/School	1	21.29	21.29	2.57
Grade/School	2	29.37	14.68	1.49
Sex/Grade/School	2	15.78	7.89	1.13

Significant at the .001

The instructor ratings and trait anxiety were found to be negatively correlated. For example, the higher the anxiety, the lower the skill level, or the higher the anxiety, the lower the fitness level. Note that the correlations were lower as the items became less discrete and more difficult to rate by the instructor. (See Table 5)

Table 5. Correlation Coefficients for Anxiety from Teacher Ratings

Source	General	Trait
Skill	-.22	-.31
Fitness	-.17	-.22
Motivation	-.17	-.20
Leadership	-.09	-.16
Emotions	-.08	-.15

Conclusions

The 16-item anxiety scale for children appears to be a most acceptable instrument for use as a way to economically and accurately identify those children who are highly anxious about their motor performance in a physical education setting. The six items measuring general anxiety might be eliminated from the instrument because the smaller number of items do not allow for an acceptable interaction when analyzed. Also, the intent is to measure "trait A" and not "general anxiety" with the devised instrument. It appears that Phillips (1966), Sarason (1960) and other authors who have written about general anxiety in children find the school setting in total to be somewhat anxiety-laden to children. It would seem that the physical education environment as a part of school would not be exempt from those findings. However, because the ten items related to trait

anxiety are perhaps pointed and direct, the other six general anxiety items might be useful to the total instrument effort which is to obtain desired information, worry about making mistakes, by creating a camouflaging effect, and, perhaps, providing a non-hostile and less coarse scale.

In this study, female scores were significantly higher than male scores in trait anxiety. Although many reasons might exist for this difference, a conjecture that the differences were due to a physical education environment that promotes unknowingly male activities, especially a program fostering ball related and team competitive related activities, might be reasonable. The answer to this question might lie in an experiment in which the instrument would be administered to children involved in a highly movement orientated/individualized/educational gymnastics/every-child-a-winner type curriculum. An analysis to see if sex differences in trait anxiety would still be the resultant in the type program mentioned, could then be made.

Finally, the physical educator may suspect that children who are low skilled, low fit, somewhat indifferent and unmotivated are also quite anxious about their motor performance. A low-skilled child or a child not very fit does not necessarily, at the elementary level, mean that that child will perform poorly in all physical education activities. However, a child whose profile consist of a combination low-skilled and high-anxious about performance might constantly and consistently demonstrate poor motor performance. It did appear, for whatever reasons, that the trait anxious child did have a profile that correlated highly to the factors of unskilled, unfit and unmotivated. Nervousness and indifference were more difficult to attach to the profile due to the lower correlations. A further study of trait anxious identified individuals and their make up in a physical education sense should be made to substantiate such a profile as has been suggested from the results of this study.

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Title: Children, Physiological Sweating, Teaching Approaches and Anxiety.

Although pressure to humanize and individualize instruction constantly bombards the physical education instructor, the practice of certain teaching methods recognized for their positive effect on children's personalities and ensuing motor performances is emerging quite slowly. A major reason, perhaps, that causes individuals to cling to traditional "tried and true" methods of teaching and not adopting movement education approaches may be due in part to a lack of research evidence indicating that the newer methods are more effective (Scott, Mashe, Rupnow). However, a very critical examination and evaluation of much of the methodological research indicates that there are few studies that compare traditional and movement education approaches; and of the few that do compare different approaches, the conclusions favoring approach A over approach B are basically biased. They are biased because different systems have different intentions and yet are evaluated on outcomes for which they have not been designed to produce. In other words, to evaluate an approach designed to influence the child's social-emotional behavior and to a lesser degree its affect on skill acquisition and then impose a measure on the data which evaluates skill acquisition alone makes the research pointless and biased.

The purpose of this study was to examine the activation levels of children while they experienced two differing teaching approaches--a competitive approach and a problem-solving approach. An additional aspect of the study was to identify children who were anxious about their physical education performance and to compare their sweat samples with a control group's sweat sample. A further purpose was to describe children's feelings about the two different environments--competitive and problem-solving (this aspect of the study was reported by Rupnow, Allan, in the Physical Educator, Vol. 33, December, 1976, No. 4, pages 186-188).

Method

Subjects. Two fourth-grade and two fifth-grade classes from an elementary school were selected as subjects for this study on the basis of having qualified six children per class as high anxious. This determination was made from the results of a Physical Education Anxiety Scale for Children, which had been administered to all ten (10) of the fourth and fifth grade classes in the elementary school. The total number of subjects included in this phase of the study amounted to 120, with 30 children in each of the four classes.

Instrument 1.

A Physical Education Anxiety Scale for Children (PEASC) devised by Rupnow (1975) was used to determine subjects' anxiousness about motor performance during

a physical education class. This scale totaling twenty items is modeled after Sarasons (1960) Anxiety Scale for Children but reflects worry about the physical education environment, not the academic subject matter as does Sarasons scale. The reliability coefficient was 82 and a study is presently underway to establish further validity of the scale. For this methodological study children who scored positively in 2/3's of the "trait" items in the PEASC were labeled as anxious subjects. The remaining children were designated as the control group.

Instrument 2.

The sweat bottle measure developed by Strahan, Todd, and Inglis (1974) was used to determine palmar sweating. In this method a small plastic bottle container of distilled water is inverted on a fingertip for a few seconds, then capped. Ions from the sweat are thus collected and increase the conductivity of the bottle's contents: the more sweat (and hence ions) collected, the greater the conductivity. Conductivity is measured at some convenient later time by inserting an electrode holder with electrodes into the bottle and recording the voltage drop across the solution. Reciprocals of the voltage readings then express palmar sweat level in conventional

conductance terms. Strahan, et al. (1974) reported that the reliability of this sweat bottle technique was adequate (reliability coefficients ranging from .73 to .93) and that its validity was promising.

Procedures

The dependent variable (i.e. the method of teaching) was alternated each lesson and repeated a total number of six times for all the classes studied. One day a lesson was taught via the problem-solving method and the next lesson via the competitive approach. To prevent an order effect within, the repeated measures design was used. Two classes (sixty S's) were begun with the competitive treatment, and two classes (sixty S's) were begun with the problem-solving treatment.

The problem-solving approach consisted of a two-part lesson with the introductory phase used to explore a movement theme. An example theme, such as wide and narrow shapes, was explored by children through challenges, some of which were: "At a low level, take up as much space as possible, stretch your body parts, now become as thin as possible. Now move to a middle level, and while balancing on three body parts, make a wide shape, now a narrow shape. Can you move backward in that shape?...."

Five stations with different pieces of gymnastics-related equipment at each station were set up in the gymnasium. Following the theme introduction, six children were designated to go to each station. The children were instructed to invent different ways of moving across, on, and over equipment, within the confines of the theme emphasized in the introductory phase. The first eight minutes of a thirty-minute class period were devoted to the introductory phase, leaving about twenty minutes for station work with rotation taking place every four minutes.

On competitive days the introductory phase of the lesson consisted of structured movement commands which were gymnastics related. These commands were, for example: "Straight sitting, straddle seat, tuck, roll back with a tuck, come up with a tuck, repeat three times, squat position to straight standing, jump and tuck, repeat three times, jump and straddle,...." The lesson then continued at the stations where the children were instructed to complete the tasks assigned at each station. These tasks included group races, contests, self-tesing charts, standards on cards, obstacle courses, and similar structured activities for which time and performances were recorded by the child or the instructor.

The researcher was in charge of all the instruction during the six periods in which each class met. After the introductory phase, the children moved to their first station and the researcher moved to the testing station. The regular physical education specialist assigned to the elementary school observed the children's performance at the four other stations, watched the clock for rotation purposes, and conducted some of the contests on competitive days. At the testing station the students (six at a time) were given specific instructions concerning the performance expectations at that station. After the instructions were given and the children had a moment to think about them, the sweat bottle measurement was taken of the six children at that station.

Each polyethelyne bottle was labeled with the students' last names. The bottles were pre-arranged by squads and set on the lunch counter for quick accessibility. The children uncapped the bottles, held them in their writing hands, pressed the index finger of the other hand against the bottle opening, and tipped it right side up. The index finger was then withdrawn from the bottle with a slow, scrapping motion to assure full retrival of all the water into the bottle. The second finger was then

pressed to the bottle, and the process was repeated. After the two measurements were taken, the bottles were capped, placed in a box, and the children were instructed to begin the movement activity at that station. The entire sweat bottle measurement consumed no more than twenty seconds and the administrator was able to ensure consistency in the measurement task. This process was repeated at the same testing station five times so that one sample was collected each lesson from all of the thirty subjects in each class. The bottles were placed in a box and returned to the laboratory to be analyzed.

The gymnastics equipment used at the testing station during the six lessons was stilts, Yugoslav ladders arranged as a double A-frame, and a cargo net. An example of the statements made on a problem-solving day at the test station (e.g. cargo net) prior to taking the sweat bottle measurement was: "Today at this station you can experiment with hanging and making different shapes as you did on the floor in the introductory part of the period. You might explore climbing up and over the net, making wide and narrow or curled and stretched shapes as you climb. You are not racing. You might be thinking about what shapes you are making and what body parts

you are using while making those shapes. Do you understand what you may do today at this station?" After a pause which allowed the subjects a chance to think about the movement requirements, the subjects were told to come to the counter and take the sweat measurement.

An example of the statements made on a competitive day prior to sweat measurements at the cargo net was: "Today at this station you will have a timed race to find out which group is able to climb up the cargo net, over the top, and down the other side in the shortest amount of time. I will stop the watch when five of you have gone over and have both feet in the bottom rung of the net. After the team race we will have an individual race to see who is the fastest cargo net climber in the class. Do you all understand how the race is to be held?" (Please note that the cargo net was fastened to a horizontal ladder with one-half drapped on each side of the ladder. This amounted to a climb up of six feet, over the ladder width of about three feet, and a descent of six feet, making it a safe height for quick movements.) A moment was allowed for questions and contemplation and then a sweat bottle measurement took place prior to the race activity.

It should be noted that prior to the experiment the children were told that for six periods they would be participating in a gymnastic-type unit and that their teacher would be a physical educator from a nearby university. They also were told that one day the lesson would be a problem-solving lesson and they would make shapes and invent different ways of moving on and over the equipment brought to their school. Another day they would have contests, races, and tasks to perform on that same equipment. The children were informed that a sweat sample would be taken. This sweat bottle measurement method was explained and demonstrated.

The children were always asked to sit Indian-style at the testing station and not to wipe their hands until after the measurements were taken. It was observed that the children followed these instructions. Finally, the stations were so arranged that the two stations preceding the testing station were of light activity (balance stations) so that the sweat ions collected were primarily due to psychological and not physiological inducements. The entire experiment was carried on indoors where a pre-lesson check was made to ensure constant room temperature throughout the experiment.

Statistical Analyses. Sweat bottle readings for the three competitive periods were averaged, as were readings for the three problem-solving periods, for those subjects (N = 110) with complete data. A split-plot analysis of variance (Anova) examined the effects on palmar sweating of Sex (male versus female), Method (problem-solving versus competitive), and the Sex-by-Method interaction. The influence on sweat level of the Anxiety Rating (28 high-anxious subjects versus 92 low-anxious subjects), Sex, and the Anxiety-Rating-by-Sex interaction were separately analyzed for the problem solving and competitive situations.

While in the split-plot Anova Sex and the Sex-by-Method interaction were non significant, the Method effect was highly significant: $F(1,108) = 110.81$, p .001. (See Table 1) Children of both sexes exhibited more palmar sweating under competitive than problem-solving conditions.

There were no significant effects for any analyses involving the Anxiety Rating scale.

TABLE 1

Summary Table of ANOVA

Source	DF	Sum of Squares	Mean Squares	F Value
Sex	1	.39	.39	1.28
Method	1	6.58	6.58	110.81*
Anxiety 1 (Problem Solving)	1	16.39	.15	.63
Anxiety 2 (Competitive)	1	22.99	.21	.83
Sex Method	1	.04	.04	.70

Significant at .001

Conclusions.

The conclusions from this study based on the sweat bottle test are that, (1) regardless of the teaching method used, the pre-activity physiological reaction of high-anxious individuals (identified as and associated with perceiving the physical education environment as generally threatening) is not significantly different when compared to the physiological reaction of the control group consisting of non-anxious individuals; and (2) that children of both sexes exhibited more palmar sweating under pre-performance competitive conditions than pre-performance problem-solving conditions.

Finally, because performance such as skill acquisition itself was not

measured or evaluated, the question whether the environment (approach) facilitated or impeded the motor performance was not answered; therefore, neither method is credited with being the most effective. A longitudinal study that would test the effect of these methods on children's behavior over time in relation to motor performance and socio/psych behavior is necessary in order to infer method effectiveness.

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